What is claimed is:

CLAIMS

1. A method for the manufacture of crank cases and cylinder heads from gray cast iron, comprising the steps of:

providing a molten controlled-content gray iron metal having a carbon equivalent of about 4.05%, comprised of about 3.40% to about 3.45% carbon, about 1.80% to about 1.90% silicon with less than about 0.03% phosphorus, while maintaining base iron sulfur at about 0.05% to about 0.07%, manganese at about 1.7 times the percentage of sulfur plus about 0.30% to about 0.40%, and base iron chromium less than about 0.10%;

transferring said molten controlled-content gray iron metal to a pouring ladle;

alloying said molten controlled-content gray iron metal with tin in said pouring ladle to a total tin content of about 0.05% to about 0.10% to provide a molten tin-alloyed, controlled-content gray iron metal;

inoculating said molten tin-alloyed, controlled-content gray iron metal with a gray iron inoculant to a further silicon addition of from about 0.10% to about 0.12%; and

pouring said molten, tin-alloyed, inoculated controlled-content gray iron metal as soon as possible after said inoculation into a casting mold.

2. The method of claim 1 wherein the step of providing the molten controlled content gray iron metal comprises determining the carbon, silicon, phosphorous, sulfur, manganese and chromium contents of scrap steel, gray iron ingots and recovered gray iron scrap material;

melting the scrap steel, gray iron ingots and recovered gray iron scrap in relative proportions to approximate the molten controlled content gray iron metal; and

adjusting the carbon, silicon, phosphorous, sulfur, manganese and chromium contents of the approximated molten controlled content gray iron metal to the extent necessary to provide the molten controlled content gray iron metal.

3. The method of claim 1 wherein the molten controlled-content gray iron metal is alloyed with tin in a percentage dependent on an important section of the part being cast.

4. The method of claim 3 wherein the molten controlled-content gray iron metal is alloyed with tin at the high end of the percentage range for parts with an important section that cools slowly.

5. The method of claim 3 wherein the molten controlled-content gray iron metal is alloyed with tin at the low end of the percentage range for parts with an important section that cools quickly.

6. An internal combustion engine part cast from a molten controlled-content gray iron metal having a carbon equivalent of about 4.05%, comprised of about 3.40% to about 3.45% carbon, about 1.80% to about 1.90% silicon with less than about 0.03% phosphorus, base iron sulfur of about 0.05% to about 0.07%, manganese of about 1.78 times the percentage of sulfur plus about 0.30% to about 0.40%, and base iron chromium less than about 0.10%, which has been alloyed, prior to casting with tin, to a total tin content of about 0.05% to about 0.10%, and inoculated with a gray iron inoculant to a further silicon addition of from about 0.10% to about 0.12%.

7. The internal combustion engine part of claim 6 wherein the internal combustion engine part includes an important section that cools slowly and the total tin content of the crankcase metal is the high end of the percentage range for tin.

8. The internal combustion engine part of claim 6 wherein the internal combustion engine part includes an important section that cools quickly and the total tin content of the crankcase metal is the low end of the percentage range for tin.

9. A method for casting internal combustion engine parts with gray cast iron, comprising the steps of:

providing a molten gray iron metal having a carbon equivalent of about 4.05%, comprised of about 3.40% to about 3.45% carbon, about 1.80% to about 1.90% silicon with less than about 0.03% phosphorus, base iron sulfur of about 0.05% to about 0.07%, manganese of about 1.7 times the percentage of sulfur plus about 0.30% to about 0.40%, and base iron chromium less than about 0.10%;

alloying said molten gray iron metal prior to pouring with tin to a total tin content of about 0.05% to about 0.10% to provide a molten tin-alloyed gray iron metal;

inoculating said molten tin-alloyed gray iron metal prior to pouring with a gray iron inoculant to a further silicon addition of from about 0.10% to about 0.12%; and

casting an internal combustion engine part as soon as possible after said inoculation.

10. The method of claim 9 wherein the step of providing the molten gray iron metal comprises determining the carbon, silicon, phosphorous, sulfur, manganese and chromium contents of scrap steel, gray iron ingots and recovered gray iron scrap material, melting the scrap steel, gray iron ingots and recovered gray iron scrap in relative proportions to approximate the molten controlled content gray iron metal; and

adjusting the carbon, silicon, phosphorous, sulfur, manganese and chromium contents of the approximated molten controlled content gray iron metal to the extent necessary to provide the molten controlled content gray iron metal.

11. The method of claim 9 wherein the molten gray iron metal is alloyed with tin in a percentage dependent on an important section of the internal combustion engine part being cast.

12. The method of claim 11, wherein the molten gray iron metal is alloyed with tin at the high end of the percentage range for internal combustion engine parts with an important section that cools slowly.

13. The method of claim 11 wherein the molten gray iron metal is alloyed with tin at the low end of the percentage range for internal combustion engine parts with an important section that cools quickly.